IN THE CLAIMS

Please substitute the following listing of claims for the previous listing of claims.

1. (Previously presented) A method of etching a silicon-containing material on a substrate, the method comprising:

placing the substrate in a process chamber; and

providing in the process chamber, an energized gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing etching gas, chlorine-containing etching gas and sidewall-passivation gas, the sidewall-passivation gas being a gas other than the fluorine-containing etching gas, wherein the volumetric flow ratio of the fluorine-containing etching gas to the chlorine-containing etching gas is from about 2:1 to about 8:1.

2. (Previously presented) A method according to claim 1 wherein the silicon-containing material on the substrate comprises regions having different compositions, and wherein the volumetric flow ratio of the fluorine-containing etching gas, chlorine-containing etching gas, and sidewall-passivation gas is selected to etch the regions having different compositions at substantially similar etch rates.

3. (Original) A method according to claim 2 wherein the silicon-containing material comprises polysilicon.

4. (Original) A method according to claim 3 wherein the regions having different compositions comprise dopant in a plurality of concentrations or types.

5. (Original) A method according to claim 2 wherein the substantially similar etch rates are etch rates that vary by less than about 5%.

6. (canceled)

7. (Previously presented) A method according to claim 1 wherein the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6.

8. (Previously presented) A method according to claim 1 wherein the chlorine-containing etching gas comprises one or more of Cl_2 or HCl.

9. (Original) A method according to claim 1 wherein the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon-monoxide.

10. (Previously presented) A method according to claim 9 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

11. (Previously presented) A method according to claim 1 wherein the process gas is absent HBr, Br_2 or CH_3Br.

12. (Previously presented) A method according to claim 11 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

13. (Previously presented) A method according to claim 12 wherein the second process gas further comprises one or more of Cl_2, $He\text{-}O_2$ and CF_4.

14. (Previously presented) A method of etching a substrate in a process chamber while simultaneously cleaning surfaces in the process chamber, the method comprising:

placing the substrate in the process chamber, the substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types; and

providing in the process chamber, an energized process gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing gas, chlorine-containing gas and sidewall-passivation gas, the volumetric flow ratio of the fluorine-containing gas to the chlorine-containing gas being from about 2:1 to about 8:1, whereby the plurality of dopant concentrations or dopant types in the silicon-containing material are etched at substantially similar rates.

15. (Previously presented) A method according to claim 14 wherein the volumetric flow ratio of the fluorine-containing gas, chlorine-containing gas and sidewall-passivation gas, is selected to etch the plurality of dopant concentrations or dopant types in the silicon-containing material at etch rates that vary by less than about 5%.

16. (Canceled)

17. (Original) A method according to claim 14 comprising at least one of the following characteristics (i) the fluorine-containing gas comprises one or more of NF_3, CF_4 or SF_6; (ii) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (iii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

18. (Previously presented) A method according to claim 14 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from about 1:1 to about 10:1.

19. (Previously presented) A method according to claim 18 wherein the process gas is absent HBr, Br_2 or CH_3Br.

20. (Previously presented) A method according to claim 19 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

21. (Previously presented) A method according to claim 20 wherein the second process gas further comprises one or more of Cl_2, He-O_2 and CF_4.

22. (Withdrawn) A process chamber comprising

a substrate support,

a gas source for providing process gas comprising fluorine-containing gas, chlorine-containing gas, and sidewall-passivation gas,

a gas energizer, and

a gas exhaust,

whereby a substrate received on the support may be processed by process gas provided by the gas source, energized by the gas energizer, and exhausted by the gas exhaust.

23. (Withdrawn) An apparatus according to claim 22 further comprising a controller that is adapted to control the volumetric flow ratio of the fluorine-containing gas, chlorine containing gas, and sidewall-passivation gas to etch regions on the substrate having different compositions at substantially similar etch rates.

24. (Withdrawn) An apparatus according to claim 23 wherein the substantially similar etch rates are etch rates that vary by less than about 5%.

25. (Withdrawn) An apparatus according to claim 24 wherein the volumetric flow ratio of the fluorine-containing gas to the chlorine-containing gas is from about 2:1 to about 8:1.

26. (Withdrawn) An apparatus according to claim 25 wherein the fluorine-containing gas comprises one or more of NF_3, CF_4 or SF_6.

27. (Withdrawn) An apparatus according to claim 26 wherein the chlorine-containing gas comprises one or more of Cl_2 or HCl.

28. (Withdrawn) An apparatus according to claim 26 wherein the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

29. (Withdrawn) An apparatus according to claim 28 wherein the volumetric flow ratio of the fluorine-containing and chlorine-containing gas to the sidewall-passivation gas is from about 1:1 to about 10:1.

30. (Withdrawn) An apparatus according to claim 26 wherein the controller is adapted not to provide in the process chamber a process gas comprising HBr, Br_2 or CH_3Br.

31. (Withdrawn) An apparatus according to claim 26 wherein the controller is adapted to provide in the process chamber, a second energized gas comprising HBr.

32. (Previously presented) A method of etching a silicon-containing material on a substrate, the method comprising:

placing the substrate in a process chamber;

in a first etching stage, providing in the process chamber, an energized gas formed from a first process gas comprising fluorine-containing etching gas, chlorine-containing etching gas and sidewall-passivation gas, the sidewall-passivation gas being a gas other than the fluorine-containing etching gas, the first process gas being absent HBr, Br_2 or CH_3Br; and

in a second etching stage, providing in the process chamber, an energized gas formed from a second process gas comprising HBr, Br_2 or CH_3Br.

33. (Previously presented) A method according to claim 32 wherein the silicon-containing material on the substrate comprises regions having different compositions, and wherein the first process gas comprises a volumetric flow ratio of fluorine-containing etching gas, chlorine-containing etching gas and sidewall-passivation gas that is selected to etch the regions having different compositions at substantially similar etch rates.

34. (Original) A method according to claim 33 wherein the silicon-containing material comprises polysilicon.

35. (Original) A method according to claim 33 wherein the regions having different compositions comprise dopant in a plurality of concentrations or types.

36. (Original) A method according to claim 33 wherein the substantially similar etch rates are etch rates that vary by less than about 5%.

37. (Previously presented) A method according to claim 32 wherein the first process gas comprises a volumetric flow ratio of fluorine-containing etching gas to chlorine-containing etching gas that is from about 2:1 to about 8:1.

38. (Previously presented) A method according to claim 32 wherein the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6.

39. (Previously presented) A method according to claim 32 wherein the chlorine-containing etching gas comprises one or more of Cl_2 or HCl.

40. (Original) A method according to claim 32 wherein the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon-monoxide.

41. (Previously presented) A method according to claim 32 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

42. (Previously presented) A method according to claim 32 wherein the second process gas comprises HBr.

43. (Previously presented) A method according to claim 42 wherein the second process gas further comprises one or more of Cl_2, He-O_2 and CF_4.

44. (Previously presented) A method of etching a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types, the method comprising:

placing a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types in a process chamber;

in a first etch step, providing in the process chamber, an energized gas formed from a first process gas comprising fluorine-containing gas, chlorine-containing gas and sidewall-passivation gas, the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing and chlorine-containing gas to the volumetric flow rate of the sidewall-passivation gas being from about 1:1 to about 10:1, wherein the volumetric flow ratio is selected such that the plurality of dopant concentrations or dopant types in the silicon-containing material are etched at etch rates that vary by less than about 5%; and

in a second etch step, providing in the process chamber, an energized gas formed from a second process gas comprising HBr.

45. (Previously presented) A method according to claim 44 comprising at least one of the following characteristics (i) the fluorine-containing gas comprises one or more of NF_3, CF_4 or SF_6; (ii) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (iii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

46. (Previously presented) A method according to claim 44 wherein the second process gas further comprises one or more of Cl_2, $He-O_2$ and CF_4

47. (Previously presented) A method of etching a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types, the method comprising:

placing a substrate comprising a silicon-containing material having a plurality of dopant concentrations or dopant types in a process chamber;

in a first etching stage, providing in the process chamber, an energized gas formed from a first process gas consisting essentially of a fluorine-containing gas, a chlorine-containing gas and a sidewall-passivation gas in a volumetric flow ratio selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%; and

in a second etching stage, providing in the process chamber, an energized gas formed from a second process gas comprising HBr, Br_2 or CH_3Br.

48. (Previously presented) A method according to claim 47 comprising at least one of the following characteristics (i) the fluorine-containing gas comprises one or more of NF_3, CF_4 or SF_6; (ii) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (iii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

49. (Previously presented) A method according to claim 47 wherein the second process gas further comprises one or more of Cl_2, $He\text{-}O_2$ and CF_4.

50. (Currently amended) A substrate etching method comprising;

placing a substrate comprising a silicon-containing material in a process chamber, the silicon-containing material comprising at least one of silicon dioxide, silicon nitride, polysilicon and monocrystalline silicon; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, chlorine-containing gas and sidewall-passivation gas.

51. (Previously presented) A method according to claim 50 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of the CF_4, chlorine-containing gas, and sidewall-passivation gas is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

52. (Previously presented) A method according to claim 50 wherein the volumetric flow ratio of the fluorine-containing gas to the chlorine-containing gas is from about 2:1 to about 8:1.

53. (Previously presented) A method according to claim 50 wherein the volumetric flow ratio of the combined volumetric flow rate of the CF_4 and chlorine-containing gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

54. (Previously presented) A method according to claim 50 comprising at least one of the following characteristics (i) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

55. (Previously presented) A method according to claim 50 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

56. (Currently amended) A substrate etching method comprising:

placing a substrate comprising a silicon-containing material in a process chamber, the silicon-containing material comprising at least one of silicon dioxide, silicon nitride, polysilicon and monocrystalline silicon; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing etching gas, chlorine containing etching gas comprising one or more of Cl_2 and HCl, and sidewall-passivation gas comprising a gas other than the fluorine-containing etching gas.

57. (Previously presented) A method according to claim 56 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of the fluorine-containing etching gas, chlorine-containing etching gas, and sidewall-passivation gas is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

58. (Previously presented) A method according to claim 56 wherein the volumetric flow ratio of the fluorine-containing etching gas to the chlorine-containing etching gas is from about 2:1 to about 8:1.

59. (Previously presented) A method according to claim 56 wherein the volumetric flow ratio of the combined volumetric flow rate of the fluorine-containing and chlorine-containing etching gas to the volumetric flow rate of the sidewall-passivation gas is from 1:1 to about 10:1.

60. (Previously presented) A method according to claim 56 comprising at least one of the following characteristics (i) the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

61. (Previously presented) A method according to claim 56 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

62. (Currently amended) A substrate etching method comprising:

placing a substrate comprising a silicon-containing material in a process chamber, the silicon-containing material comprising at least one of silicon dioxide, silicon nitride, polysilicon, metal silicide and monocrystalline silicon; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, Cl_2 and N_2.

63 (Previously presented) A method according to claim 62 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of CF_4, Cl_2 and N_2 is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

64. (Previously presented) A method according to claim 62 wherein the volumetric flow ratio of CF_4 to Cl_2 is from about 2:1 to about 8:1.

65. (Previously presented) A method according to claim 62 wherein the volumetric flow ratio of the combined volumetric flow rate of CF_4 and Cl_2 to the volumetric flow rate of N_2 is from 1:1 to about 10:1.

66. (Previously presented) A method according to claim 62 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

67. (Previously presented) A substrate etching method comprising:

placing a substrate comprising a silicon-containing material in a process chamber; and

etching the silicon-containing material by providing in the process chamber, an energized gas formed from a process gas consisting essentially of CF_4, Cl_2 and N_2.

68. (Previously presented) A method according to claim 67 wherein the silicon-containing material comprises a plurality of dopant concentrations or dopant types, and wherein the volumetric flow ratio of CF_4, Cl_2 and N_2 is selected to etch the plurality of dopant concentrations or dopant types at etch rates that vary by less than about 5%.

69. (Previously presented) A method according to claim 67 wherein the volumetric flow ratio of CF_4 to Cl_2 is from about 2:1 to about 8:1.

70. (Canceled)

71. (Previously presented) A method according to claim 67 further comprising a second etch step in which an energized gas formed from a second process gas comprising HBr is provided in the process chamber.

72. (Previously presented) A substrate etching method comprising;

placing the substrate in a process chamber;

in a first etching stage, providing in the process chamber, a first energized gas formed from a first process gas comprising CF_4, chlorine-containing gas and sidewall-passivation gas; and

in a second etching stage, providing in the process chamber, a second energized gas formed from a second process gas comprising a bromine-containing gas.

73. (Previously presented) A method according to claim 72 wherein the bromine-containing gas comprises HBr, Br_2 or CH_3Br.

74. (Previously presented) A method according to claim 72 wherein the bromine-containing gas comprises HBr.

75. (Previously presented) A method according to claim 72 comprising at least one of the following characteristics (i) the chlorine-containing gas comprises one or more of Cl_2 or HCl; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

76. (Previously presented) A substrate etching method comprising:

placing the substrate in a process chamber; and

In a first etching stage, providing in the process chamber, a first energized gas formed by coupling RF or microwave energy to a first process gas comprising fluorine-containing etching gas, chlorine-containing etching gas, and sidewall-passivation gas comprising a gas other than the fluorine-containing etching gas; and

in a second etching stage, providing in the process chamber, a second energized gas formed from a second process gas comprising bromine-containing gas.

77. (Previously presented) A method according to claim 76 wherein the bromine-containing gas comprises HBr, Br_2 or CH_3Br.

78. (Previously presented) A method according to claim 76 wherein the chlorine containing etching gas comprises one or more of Cl_2 and HCl.

79. (Previously presented) A method according to claim 78 wherein the bromine-containing gas comprises HBr.

80. (Previously presented) A method according to claim 76 comprising at least one of the following characteristics (i) the fluorine-containing etching gas comprises one or more of NF_3, CF_4 or SF_6; or (ii) the sidewall-passivation gas comprises one or more of nitrogen, hydrogen or carbon monoxide.

81. (Previously presented) A substrate etching method comprising:

placing the substrate in a process chamber; and

providing in the process chamber, an energized gas formed from a process gas consisting essentially of CF_4, Cl_2 and N_2, wherein the volumetric flow ratio of the combined volumetric flow rate of CF_4 and Cl_2 to the volumetric flow rate of N_2 is from about 1:1 to about 10:1.

82. (Previously presented) A method according to claim 81 further comprising a second etching stage in which an energized gas formed from a second process gas comprising bromine-containing gas is provided in the chamber.

83. (New) A substrate etching method comprising;

placing a substrate comprising a silicon-containing layer in a process chamber, the silicon-containing layer consisting essentially of metal silicide; and

etching the silicon-containing layer by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, chlorine-containing gas and sidewall-passivation gas.

84. (New) A substrate etching method comprising:

placing a substrate comprising a silicon-containing layer in a process chamber, the silicon-containing layer consisting essentially of metal silicide; and

etching the silicon-containing layer by providing in the process chamber, an energized gas formed by coupling RF or microwave energy to a process gas comprising fluorine-containing etching gas, chlorine containing etching gas comprising one or more of Cl_2 and HCl, and sidewall-passivation gas comprising a gas other than the fluorine-containing etching gas.

85. (New) A substrate etching method comprising:

placing a substrate comprising a silicon-containing layer in a process chamber, the silicon-containing layer consisting essentially of metal silicide; and

etching the silicon-containing layer by providing in the process chamber, an energized gas formed from a process gas comprising CF_4, Cl_2 and N_2